

# REPORT DOCUMENTATION PAGE

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## 13. SUPPLEMENTARY NOTES

## 14. ABSTRACT

The Gordon Research Conference on Laser Diagnostics was held at Mount Holyoke College, South Hadley MA on 1-6 July 2001. The conference included 130 participants. Research discussed at the conference included quantitative measurements to test combustion chemistry, picosecond measurements to quantify collisional effects, infrared diagnostics, velocity measurements, measurement techniques for fuel distributions, diagnostics to understand turbulent flow, innovative optical measurement techniques, practical measurements in harsh engine environments, and quantitative measurements to understand soot formation.

## 15. SUBJECT TERMS

laser diode spectroscopy velocimetry soot combustion turbulence picosecond

## 16. SECURITY CLASSIFICATION OF:

<b>a. REPORT</b> Unclassified	<b>b. ABSTRACT</b> Unclassified	<b>c. THIS PAGE</b> Unclassified
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## 2001 GORDON RESEARCH CONFERENCE

### on Laser Diagnostics in Combustion

### FINAL PROGRESS REPORT

AFOSR

F49620-01-1-0451

The Gordon Research Conference (GRC) on Laser Diagnostics in Combustion was held at Mount Holyoke College, South Hadley, MA, July 1-6, 2001. The conference was well attended with 130 participants (list enclosed). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both US and foreign scientists, senior researchers, young investigators, and students.

In designing the formal speakers program, emphasis was placed on current unpublished research and discussion of the future target areas in this field. There was a conscious effort to stimulate lively discussion about the key issues in the field today. Time for formal presentations was limited in the interest of group discussions. In order that more scientists could communicate their most recent results, poster presentation time was scheduled. In addition to these formal interactions, "free time" was scheduled to allow informal discussions. Such discussions are fostering new collaborations and joint efforts in the field (program enclosed).

I want to personally thank you for your support of this Conference. As you know, in the interest of promoting the presentation of unpublished and frontier-breaking research, Gordon Research Conferences does not permit publication of meeting proceedings. If you wish any further details, please feel free to contact me. Thank you.

Jay Jeffries  
Conference Chair

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# ***Laser Diagnostics in Combustion***

Mount Holyoke College  
South Hadley, MA  
July 1-6, 2001

**Jay B. Jeffries**, Chair  
**Marcus Alden**, Vice Chair

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Visit the [Conference Home Page](#) for more information.

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## **Sunday, July 1**

6:00-7:00 PM Dinner

7:15 PM Welcome to the Conference and Announcements:  
**Jay Jeffries**, Stanford University, Conference Chair

## **Sunday PM, July 1 Session I**

### ***Quantitative Measurements to Test Combustion Chemistry***

Discussion Leader: **Gregory P. Smith** (SRI International)

7:30-9:30 PM **Pascale Desgroux** (University of Science and Technology of Lille)  
Cavity Ringdown Measurements of Minor Species in Flames: Impact on Combustion Chemistry

**Dr. Andrew McIlroy** (Sandia National Laboratory)  
"Cavity Ringdown Spectroscopy for Quantitative Combustion Measurements"

9:30 - 10 PM "A Remembrance for the late Professor Peter Andresen"  
**Professor Katharina Kohse-Hoeinghaus**, University of Bielefeld  
**Professor Erhard Rothe**, Wayne State University  
**Dr. Gerd Gruenefeld**, RWTH Aachen

## **Monday AM, July 2 Session 2**

### ***ps Measurements to Quantify Collisional Effects***

Discussion Leader: **Professor Jürgen Wolfrum** (University of Heidelberg)

7:30-8:30 AM Breakfast (\*)

9:00-10:00 AM

**Andreas Brockhinke** (University of Bielefeld)  
Evolution of Spectra by Energy Transfer -- Implications for Flame Measurements

10:00 AM Group photo / Coffee break

10:30-12:30 PM **Roger Farrow** (Combustion Research Facility, Sandia National Laboratory)  
Measurements of Molecular Energy Transfer Using ps Lasers  
**Robert Lucht** (Texas A&M University)  
The Physics of Short Pulse Polarization Spectroscopy

12:30-13:30 PM Lunch (\*\*)

5:00-6:00 PM Poster Session: **Marcus Alden** Lund, Sweden, Conference Vice-Chair

6:00-7:00 PM Dinner

**Monday PM, July 2**  
**Session 3**

***Infrared Diagnostics to Exploit New Tools***

Discussion Leader: **Professor Philip Varghese** (University of Texas)

- 7:30-9:30      **Anatoliy Kosterev**, Rice University  
Gas sensing applications of quantum cascade lasers
- Brian Kirby** Sandia National Laboratory  
PLIF Imaging Schemes Using Infrared Laser Sources and Vibrational Fluorescence
- 9:30 PM        Poster Session continues

**Tuesday AM, July 3**  
**Session 4**

***Velocity Measurements: Challenges and Solutions***

Discussion Leader: **Mark Allen** (Physical Sciences, Inc.)

- 7:30-8:30 AM    Breakfast (\*)
- 9:00-10:00 AM   **Marshall Long** (Yale University)  
Velocity from Scalars -- Can this really work?
- 10:00 AM        Coffee break
- 10:30-12:30 PM   **Robert Pitz** (Vanderbilt University)  
Molecular Tagging Velocimetry  
**Richard Schodl** (DLR Cologne)  
Laser Velocimetry for Combustor Flow Analysis
- 12:30-1:30 PM   Lunch (\*\*)
- 5:00-6:00 PM    Poster Session
- 6:00-7:00 PM    Dinner

**Tuesday PM, July 3**  
**Session 5**

***Challenges in the Measurement of Fuel Distributions***

Discussion Leader: **Dr. Nico Dam**, Katholieke Universiteit Nijmegen

- 7:30-9:30 PM    **Christof Schulz** (University of Heidelberg)  
Fuel Tracer-LIF Techniques: Possibilities and Pitfalls  
**Douglas Greenhalgh** (Cranfield University)  
Optical Diagnostics for Practical Two-Phase Fuel Injection
- 9:30 PM        Poster Session continues

**Wednesday AM, July 4**  
**Session 6**

***Diagnostics to Understand Turbulent Flow***

Discussion Leader: **Robert Barlow** (Combustion Research Facility, Sandia National Laboratory)

- 7:30-8:30 AM    Breakfast (\*)
- 9:00-10:00 AM   **Andreas Dreizler** (Technical University of Darmstadt)  
Gas Turbine Combustion: A Challenging Task for Laser Diagnostics
- 10:00-10:15 AM   Conference Survey: **Jay Jeffries**, Stanford University, Conference Chair
- 10:00 AM        Coffee Break
- 10:30-12:30 PM   **Juan-Carlos Rolon** (Ecole Centrale of Paris)  
Laser Diagnostics to Understand Flame-Vortex Interactions  
**Alfred Leipertz** (University of Erlangen-Nürnberg)  
Simultaneous 2D Velocity and Gas Temperature Measurements using a Combined PIV and Filtered Rayleigh Technique
- 12:30-13:30 PM   Lunch (\*\*)
- 5:00-6:00 PM    Poster Session

6:00-7:00 PM Dinner  
7:15-7:30 PM Business Meeting / Conference Vote

**Wednesday PM, July 4**  
**Session 7**

***Innovative Optical Measurement Techniques***

Discussion Leader: **Paul Ewart** (Oxford University)

7:30-9:30 PM **Richard Miles** (Princeton University)  
A Renaissance in Raman Imaging using Dispersive and Fluorescent Atomic Filters  
**Moiria Hilton** (Reading University)  
FTIR Spectroscopy of Gas Turbine Engine Exhaust Emissions  
9:30 PM Results of Conference Vote: **Marcus Alden**, Lund, Sweden, Conference Vice-Chair  
9:45 PM Poster Session continues

**Thursday AM, July 5**  
**Session 8**

***Practical Measurements in Harsh Environments: Engines***

Discussion Leader: **Volker Sick** (University of Michigan)

7:30-8:30 AM Breakfast (\*)  
9:00-10:00 AM **Hans ter Meulen** (Catholic University of Nijmegen)  
Laser Diagnostics in a Heavy Diesel Engine  
10:00 AM Coffee break  
10:30-12:30 PM **Mike Drake** (General Motors Research Laboratory)  
Designer<sup>®</sup> Diagnostics for Gasoline Direct Injection Engines  
**Scott Sanders** (Stanford University)  
Multiplexed Diode Laser Sensors for Multi-Parameter Measurements in Pulse Detonation Engines  
12:30-1:30 PM Lunch (\*\*)  
5:00-6:00 PM Poster Session  
6:00-7:00 PM Dinner

**Thursday PM, July 5**  
**Session 9**

***Quantitative Measurements to Understand Soot Formation***

Discussion Leader: **Robert Santoro** (Penn State University)

7:30-9:30 PM **Christopher Shaddix** (Combustion Research Facility, Sandia National Laboratory)  
Nanoscale Insights into the LII Process and Implications for its Use as a Soot Diagnostic  
**Frederik Ossler** (Lund Institute of Technology)  
Picosecond Laser-Induced Emission from PAH at Elevated Temperatures  
9:30 PM Poster Session continues

**Friday, July 6**

7:30-8:30 AM Breakfast  
End of conference

(\*) The time after breakfast should be used to remove the posters of the previous session.

(\*\*) During the break in the afternoon the posters for the evening session can be put up.

Poster presenters present for discussions (5:00-6:00 PM and 9:30-10:30 PM).

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# LASER DIAGNOSTICS IN COMBUSTION

Mount Holyoke College, South Hadley, MA  
(01-Jul-01) - (06-Jul-01)

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**NOTE:** Receipt of Application does not guarantee acceptance to a Conference. Applications are reviewed by the Conference Chair. If the Chair approves your application, you become **Accepted**, and a registration packet will be mailed immediately. Please allow 3-5 days for your registration to reach you by mail once your name appears. When your registration packet has been received back in our office, you become **Registered**.

Only those who have been **Accepted** or **Registered** will have their names listed below. Names of people who have only applied and have yet to be accepted will NOT appear.

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